High resolution mapping of reef utilisation by humans in Ningaloo Marine Park

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This project forms part of the Wealth from Oceans Flagship Ningaloo Collaboration Cluster. The main objectives are (1) to determine the spatial and temporal distribution of recreational activities (e.g., fishing, diving, snorkelling, kayaking, surfing etc) within the reef lagoon system at Ningaloo Marine Park (NMP) and (2) to relate distribution patterns to factors such as biodiversity, physical conditions, park zoning, access roads and accommodation nodes.

During 2007, intensive field work, based out of Exmouth, was conducted throughout the year. Aerial and land-based coastal surveys covered the entire 300 km length of the NMP and type and location of all shore-based recreational activity and boating activity in the lagoon were recorded in a geo-referenced format for input into a Geographical Information System. Land-based coastal surveys, conducted using a four wheel drive vehicle, were split into three areas: Exmouth to Yardie Creek, Yardie Creek to Coral Bay and Coral Bay to Red Bluff. These land-based surveys also provided the opportunity for researchers to interview people engaged in recreational activities in the NMP in order to obtain information on demographics, trip duration, travel and site-specific usage patterns, other activities conducted in the NMP as well as catch and effort by recreational fishers (to supplement the Department of Fisheries Gascoyne creel survey).

All data from the aerial surveys have been entered into an Access database and validated. In total, 34 aerial surveys were conducted following a stratified sampling design whereby more flights were conducted during the winter months. From these flights, “snapshots” of activity with regard to location of boats, camps, vehicles and people along the coast have been obtained and they clearly highlight nodes of activity and the winter increase in usage of the NMP. In total, 2 884 observations of boats and 4 770 observations of shore-based activity were made on these flights. These data, although more comprehensive, are comparable with aerial counts of camping at Ningaloo that have been conducted over the past decade by staff of the DEC district office in Exmouth. Over the next year, work will focus on analysis and interpretation of these geo-referenced data.

Equal numbers of land-based coastal surveys were conducted during each month of 2007 (n=192 days of field work). The data from these surveys have also been entered into an Access database and validated. These surveys enabled greater resolution with respect to the specific activities conducted by people in the marine park, especially the lagoonal areas where diffuse access by the many people camping along the shore has not been spatially explicit in the past. Once again, the clear seasonal pattern in use of the park was evident, particularly the sustained usage over the winter months between April and October. In total, 7 889 observations of shore and boat-based activities were made. In terms of observations of boats per month these ranged from 75 in January to 359 in August and for shore-based activities the range was from 133 observations in March to 861 observations in July. Altogether, 25 655 people were recorded as participating in shore-based recreational/tourist activities in the NMP during the study period. Of these, 32% were relaxing on the beaches, 11% snorkelling, 8% shore-fishing and 7% swimming. Spatial and temporal analyses of these data are underway in line with the objectives of the project.

Indicators that can be used by managers to easily monitor usage of the NMP will be explored (e.g. number of cars in car parks like Turquoise Bay relative to number of people engaged in activities at the locality). In addition, during the design and implementation of the coastal surveys, compatibility with existing DEC compliance protocols was taken into account so that the high resolution dataset can complement current DEC monitoring activities.

During the coastal surveys, 1208 face-to-face interviews with users of the NMP were conducted. Locations of interviews were spread throughout the NMP although their distribution was proportional to the relative abundance of users in the different parts of the park. The fine-scale resolution and geo-referenced nature of this dataset makes it particularly pertinent to site-specific planning and management of Ningaloo Reef and the adjacent coastline.

The majority of interviewees were from Western Australia (62%), particularly the Perth metropolitan area. International visitors and interstate visitors comprised 23% and 14% of interviewees, respectively. Over half of the interviewees had visited the NMP on a previous occasion, and 43% of these indicated that they always stayed at the same location, indicating strong site loyalty. Though visitors to the region were most likely to have visited the NMP less than twice in the previous 12 months, most of the local residents of Exmouth that were interviewed indicated that they had visited the NMP from 10 – 100 times in the previous year.

The most popular types of accommodation for visitors were caravan parks and wilderness camping, with the average length of stay 15 days.

There were > 50 different types of activity being undertaken at the time of the interviews though, as with the land-based surveys, relaxing on the beach, shore fishing, beach walking and snorkelling were most popular. The mean length of time spent at the beach during a day trip was 3.1 hours and interviewees had participated in an average of three different activities (range of 1 – 10 activities) during their stay. The home range of visitors from beach access points was small and clustered around these locations.

Activities at three popular beaches (Coral Bay, Turquoise Bay and Bundegi Beach) were monitored from early morning to evening during the 2007 Easter and July school holidays to establish the diurnal pattern of usage with regard to beach activities, boat launching and tourist operations. These data formed part of an MSc thesis and will be used to scale and contextualise observational data from the overall project relative to time of day.

During 2007, some waterproof oceanographic trackers that can be attached to recreational and tourist vessels to map routes and determine the spatial footprint of various activities at Ningaloo were manufactured. These were tested on tourist and research vessels and satisfactory tracking was obtained. During 2008 this aspect of the project will be expanded.

Overall, the Ningaloo human usage mapping project is on schedule and the results will contribute directly to the integrated ecosystem model being developed for the Ningaloo region through the Collaboration Cluster. It is expected that the quantitative information from the human use mapping project will have the required spatial and temporal resolution to assist managers with predicting the likely consequences of future coastal development and changes in management regimes in the region.